

STRATIGRAPHIC AND GEOGRAPHIC DISTRIBUTION OF
CORE IN BLACK SHALE SEQUENCE (MISSISSIPPIAN AND DEVONIAN)
IN APPALACHIAN BASIN

EGSP

Roy C. Kerferle^{1/} and Paul Edwin Potter^{2/}

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The source of the core material available for study in the Eastern Gas Shale Project (EGSP) is basic data available to all cooperators. As a result of a workshop in Reston, Virginia, January 4, 1978, stratigraphers of the EGSP agreed to map seven major subdivisions within the Devonian shale sequence in the Appalachian basin. These seven subdivisions are:

1. Cleveland Member of the Ohio Shale.
2. Huron Member of the Ohio Shale including any equivalent of the Chagrin Shale and the Three Lick Bed in Ohio and Kentucky, and Dunkirk equivalents in New York, Pennsylvania, and West Virginia.
3. Java Formation, base marked by the Pipe Creek Shale Member.
4. West Falls Formation, base marked generally by the base of the Rhinestreet Member.
5. Sonyea Formation, base marked by the base of the Middlesex Shale Member.
6. Genessee Formation, base marked by the Genesee Shale member or the Penn Yan Shale in parts of New York, by the Burket Member of the Harrell Shale in Pennsylvania, Maryland, and West Virginia.
7. Hamilton Group, including the Marcellus Shale equivalents.

Units 1 and 2 are mainly western units. The others are primarily eastern units.

^{1/} U.S. Geological Survey, University of Cincinnati (13), Cincinnati, Ohio 45221.

^{2/} Department of Geology, University of Cincinnati (13), Cincinnati, Ohio 45221.

Characterization studies are only meaningful as they are related to stratigraphic units. Hence, for the shale sequence, this means relating characterization studies to basin wide mappable units, and thinking in terms of stratigraphic petrology and geochemistry and the stratigraphic distribution of physical properties. The figures and tables of this report furnish a summary of the present stratigraphic and geographic distribution of available cores (Figs. 1 and 2, Tables 1 and 2).

The data presented are for all of the oriented core obtained by the Morgantown Energy Research Center (MERC), and also include some additional unoriented cores. In tabular form, we have included the pertinent well data, contractor, driller, location, elevation, and total depth. We have also included the depths of the cored interval, formations' tops, and locally, formation bases for stratigraphic intervals recognizable on gamma-ray logs. These tops were furnished by F. R. Ettensohn, E. N. Wilson, and Jaffrey Zafar of the Kentucky Research Group, Arthur Van Tyne of the New York Geological Survey, Frank Majchszak of the Ohio Department of Natural Resources, Division of Geological Survey, Robert Piotrowsky of the Pennsylvania Geological Survey, J. Schwietering of the West Virginia Geological Survey, J. B. Maynard of the University of Cincinnati, and one of us (RCK). The authors are acknowledged by last name on Table 2. Alphanumeric coding of formational tops follows the dictionary released by Petroleum Information, which is that of the Well History Control System (WHCS).

We anticipate that the information in this report will be useful in the following applications:

1. Planning the location of new cores.

2. Coordination of characterization studies with stratigraphy - essential in analyzing the gas potential of the basin.
3. A guide for determining where and in what stratigraphic horizon additional samples should be obtained from outcrop sections.

Discussion

Obvious from figures 1 and 2 is the lack of oriented cores from several major intervals in the basal part of the sequence and from the important states of Pennsylvania and New York. A core planned from a site in New York will alleviate both the geographic and stratigraphic aspects.

The cores from Ohio reflect the efforts we at Cincinnati have made to supplement MERC oriented cores with unoriented cores. In spite of the short lengths and restricted stratigraphic range of most of these cores, comparisons are possible within the Ohio Shale.

We intend to keep this inventory current to the completion of the final report and will appreciate your suggestions and additions.

The tops in Table 2 are useful in allowing recognition of stratigraphic units by those workers performing physical and chemical tests on the shale.

We have found however, that the depths recorded on wire line logs may differ from depth in core by as much as 10 feet. Extrapolations from tops shown in table 2 directly to cored intervals should be made only after a gamma ray profile is made of the core. Detailed correlation then can be made between the synthetic gamma ray curve of the core and the gamma ray trace on the wire line log.

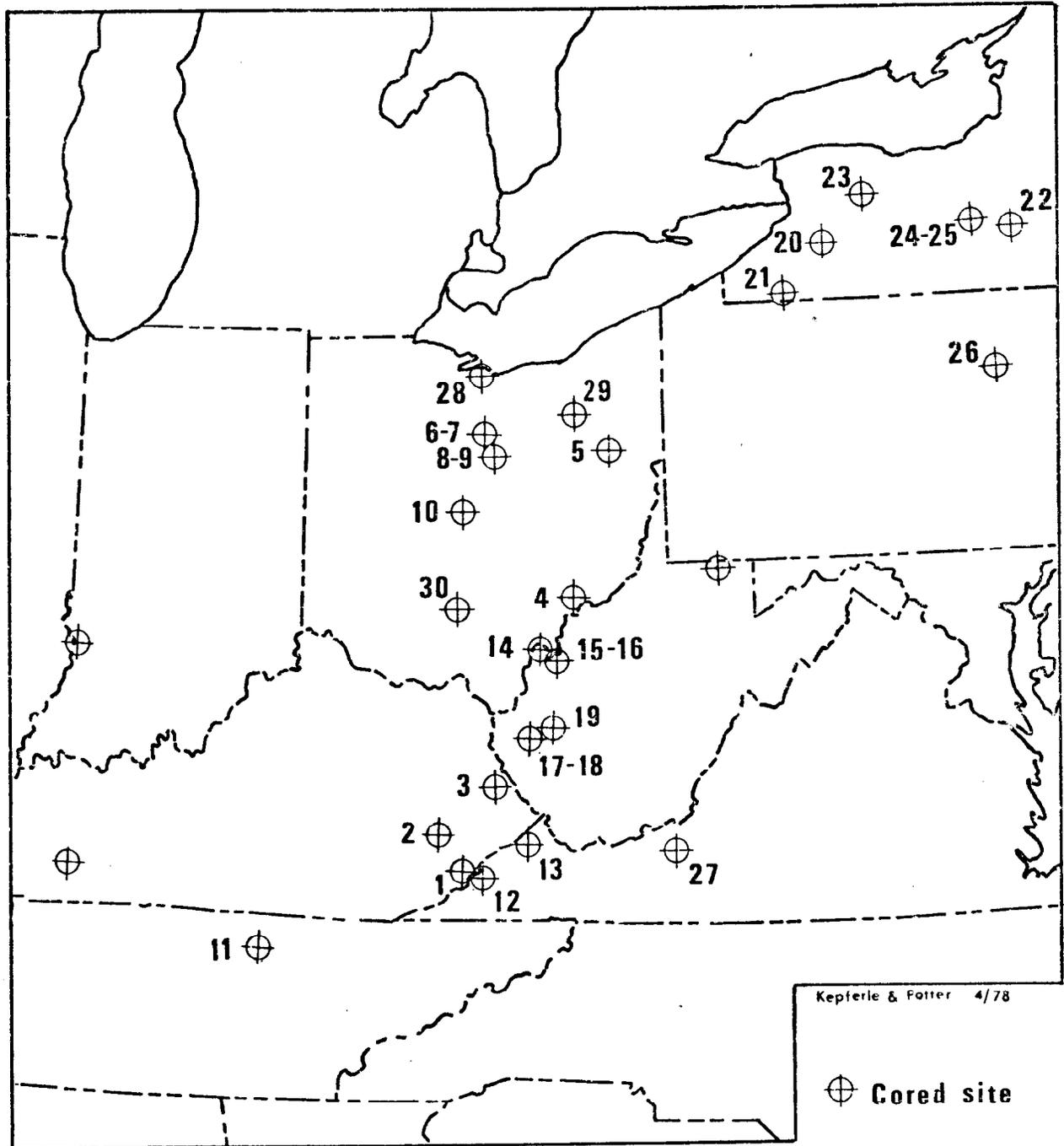


FIGURE 1. GEOGRAPHIC DISTRIBUTION OF CORE IN BLACK SHALE SEQUENCE (MISSISSIPPIAN AND DEVONIAN) IN APPALACHIAN BASIN (Number refers to listing in Table 1 and Figure 2)

Table 1

Wells and drill holes from which cores of the Mississippian and Devonian shale sequence in the Appalachian basin are available for study.

Chart No. API No. (UC No.)	SOURCE	CORED INTERVAL	Chart No. API No. (UC No.)	SOURCE	CORED INTERVAL
1 16-133 06001 (LE-1)	Kentucky Dept. Highways Pine Mountain Tunnel CH-5 3900 FSL X 3720 FWL 14-G-80 Roxanna GQ Letcher Co., KY Elev. datum TD	Surf.-620+	11 (OV-1)	Dresser Industries OCI-8 Diamond Drill hole 100 FSL X 1650 FWL Sec. 4-3S-52E Crawford Quad. Overton Co., TN Elev. (map) 900 ft TD 409+	351- 409
* 2 16-193 28982 (PE-1)	Kentucky West Virginia Gas No. 7239 Nicholas Combs 1960 FNL X 325 FWL 19-K-76 Hazard N. GQ Perry Co., KY Elev. datum 1090 KB; 1080 Gr.; TD 3734	2369-2708	* 12 (WI-1)	Columbia Gas Transmission Corp. #20338 Pennsylvania-Virginia Corp. 37°00'37" N; 82°41'14" W. Wise Co., VA, Permit No. 253 Elev. datum 2405.5 KB; 2395.5 GL; TD 5741	5684-5689 5210-5475 4870-4985
* 3 16-159 31020 (MA-1)	Columbia Gas Transmission Co. No. 20336 Fee 2750 FNL X 1650 FWL 16-P-85 Kermit GQ Martin Co., KY Elev. datum 994 KB; 934 Gr.; TD 3457	2429-3411	* 13 (BU-1)	Columbia Gas Transmission Co. #20342 Columbia Gas Transmission Co. 37°16'03" N; 82°13'03" W Buchanan Co., VA Elev. TD	4223-4253= Berea interval
* 4 23521 (WA-1)	River Gas Co. Florence L. House No. R109 6200 W of 81°32'30" W; 8400 S of 39°25'00" N Fleming Quad. Washington Co., OH Elev. datum TD 6262	3490-3714	* 14 (MS-1)	Reel Drilling Co. D/K Farm No. 3 Robinson District 38°55'30" N; 82°03'45" W Cheshire Quad. Mason Co., WV Elev. datum 675 KB; 665 GL; TD 3423	2520-3406
* 5 20835 (CA-1)	Canton Oil and Gas Co. Glen-Gery No. 5-745 600 FSL X 760 FWL SW 1/4 Sec. 29, T.16N., R.7W. Rose Twp. Carroll Co., OH Elev. datum TD 5187	2080-2200 3080-3200	* 15 21369 (JA-1)	Consolidated Gas Co. E. L. Bailer No. 11960 2.18 mi W of 81°50'00" W; 0.32 mi S of 38°50'00" N Jackson Co., WV Elev. datum 846 KB; 835 GL; TD 3935	3410-3500 3600-3797
6 (RI-1)	Jerry Moore, Inc. H. N. Romig Unit No. 1-11257 706 FNL X 196 FWL SW 1/4 Sec. 30, Plymouth Twp., Permit 523 Richland Co., OH Elev. datum 1074 KB; 1071 GL; TD 1469	550- 560 675- 710	* 16 (JA-2)	Consolidated Gas Co. W. L. Pinnell 12041 0.77 mi W of 81°50'00" W; 2.97 mi S of 38°55'00" W Jackson Co., WV Elev. datum 673 KB; 662 GL; TD 3744	3220-3690
7 (RI-2)	Jerry Moore, Inc. Kenneth Egner No. 1 62 FNL X 1335 FWL NW 1/4 Sec. 30, Plymouth Twp., Permit 526 Richland Co., OH Elev. datum 1076 DF; TD 1456	330- 367	* 17 21636 (LI-1)	Columbia Gas Transmission Corp. No. 20402 Fee 3.94 mi W of 82°10'00" W; 4.83 mi S of 38°10'00" N Lincoln Co., WV Elev. datum 1163 KB; 1153 GL; TD 3983	2654-2770 3000-3118 3290-3588 3886-3968
8 (RI-3)	Lew Bates, Jr. P. L. Kocheiser No. 2 422 FSL X 550 FEL SE 1/4 Sec. 30 Washington Twp., Permit 527 Richland Co., OH Elev. 1152 KB; TD 1204	665- 690 1020-1045	* 18 (LI-2)	Columbia Gas Transmission Corp. No. 20403 Fee 3.1 mi W of 82°10'00" W; 4.5 mi S of 38°10'00" N Lincoln Co., WV Elev. datum 1202 KB; 1190 GL; TD 4065	2720-4028
9 (RI-4)	Lew Bates, Jr. (Great Basin Petroleum Company) P. L. Kocheiser No. 3 950 FNL X 490 FEL NW 1/4 Sec. 31 Washington Twp., Permit 528 Richland Co., OH Elev. 1157 KB; TD 1185	610- 634	19 (LI-3)	Pennzoil Corp. Zona Hughes No. 5 170 E of 81°52'30" W; 8930 N of 39°15'00" N Duval Dist. Lincoln Co., WV Elev. datum 1011 KB; 1003 GL; TD 2570	2495-2499
10 (DE-1)	U.S. Corps of Engineers Alum Creek Reservoir Borings C104 189,925.11 N X 1,820,296.66E 806.9-681.5 elev D18 189,272.21 N X 1,869,767.17E 850.9-799.7 elev Orange Twp., Galena Quad. Delaware Co., OH Elev. TD		20 31-009- 06740	Oak Ridge National Laboratory 177-1500 Western New York Nuclear Fuel (Laona-Rhinestreet) Service Center NX-1 .83 mi S 42°27'30" .49 mi W 78°37'30" Ashford Twp., Cattaraugus Co., NY Elev. 1372 DF; TD 1500	

* Oriented core

Table 1

Wells and drill holes from which cores of the Mississippian and Devonian shale sequence
in the Appalachian basin are available for study--Continued

Chart No. API No. (UC No.)	SOURCE	CORED INTERVAL	Chart No. API No. (UC No.)	SOURCE	CORED INTERVAL
21 31-013- 10873	Columbia Gas Transmission Co. Warn No. 1 1.92 mi S 42°05' 1.82 mi W 79°02'30" Carroll Twp. Chautauqua Co., N.Y. Elev. 1456 KB; TD 4589	1440-1508 (Gowanda) 2090-2150 (Angola) 2635-2695 (Rhinestreet- Cashaqua)	26	California Company A.W. Bennett No. 1 6700 N 41°20'; 4350 W 76°30' Eaglesmere 15-min. quad Sullivan Co., PA Elev. 1482 DF; TD 12343	6535-6551 (Genesee) 7371-7390 (Mahantango eq.) 8259-8404 (Marcellus- Onondaga)
22 31-109- 13173	Cargill Salt Co. Core Test No. 17 1.29 mi S 42°32'30" .27 mi W 76°30' Lansing Twp. Tompkins Co., N.Y. Elev. 835 DF; TD 2784	2.5-2784 (Ithaca- Onondaga+)	27	California Company Kipps Anthracite Coal Co. No. 1 1190 N of 37°11'; 3209 W of 80°27' Montgomery Co., VA Elev. 2470; TD 9340	4056-4066 (Millboro Shale) Huntersville Chert
23 31-121- 04546	Niagara Brine Corp. Core Test No. 101 1.56 mi S 42°52'30" 1.17 mi W 78°10' Middlebury Twp Wyoming Co., N.Y. Elev. 1582 Grd; TD 1850	0-1850 (Nunda- Onondaga+)	28	Ohio Geological Survey Prout Station Core Lot Q-3, Oxford Twp. Erie Co., OH Elev. ; TD	0-120+ Ref: Louden, R.O., 1965 Bowling Green St. Univ., M.S. thesis.
24 31-123- 13174	Morton Salt Co. Core Test No. 11 .81 mi S 42°35' .91 mi W 76°55' Starkey Twp. Yates Co., N.Y. Elev. 730 Grd; TD 2077	15.5-2077 (Genesee- Onondaga+)	29	Columbia Southern Chemical Div. Pittsburgh Plate Glass Barberton Limestone Mine Lot 64, T.1N., R.12W. Norton Twp. Summit Co., OH Elev. 1045 A.T.; TD 2851	0-2851 (some missing)
25 31-123- 09851	Morton Salt Co. Core Test No. 14 2.3 mi S 42°37'30" 1.36 mi W 76°55' Milo Twp. Yates Co., N.Y. Elev. 738 KB; TD 1348	950-1348 (Lower Levanna- Onondaga)	30	Ohio State University Engr. Exp. Sta. 0-577 J. L. Hirsh No. 1 (alternate 0.5-inch 4900 FEL x 825 FSL of MS-2216 intervals missing) Chillicothe West x = 1,853,000 Huntington Twp. y = 473,500 Ross Co., OH Elev. 880 Grd; TD 577	

Table 2

Formation tops for cores of the black shale sequence (Mississippian and Devonian)
in the Appalachian basin.

Well No. (Table 1)	Sunbury Shale (Big Stone Gap Shale Member of Chapanooga Shale)	Berea Sandstone (Bedford Shale)	Ohio Shale (Cleveland Member)	Chagrin Shale (Three Lick Bed)	Huron Member	Lower Part Huron Member (Dunkirk Shale)	Olentangy Shale (Java Formation)	West Falls Formation (Rhinestreet Member)	UNCONF. / FAULT	302HMLN (302MRCLH)	302ONDGL	Tops by
	351SNBRH (319BSGPH)	351BERES (315BDFDH)	3060HIOH (306CLDH)	306CGRNH (306THRLH)	306HURNH	306HURNL (306DKRKH)	306OLNGH Java Fm.	WEST FALLS				
1	105.3	139.6	237.0	280.8	296.5				619.9			Ettensohn
*2	2301	2338	2374	2430	2455- 2494	2594	2668				2718	Wilson
*3	2285	2306	2433	2523	2655- 2795	2959	3125			(3559)	3419	Wilson
*4		1981			3168- 3204	3504	3731	^{1/} (4110- 4298)	4298	4298	4348	Majchszak
*5		Base = 974				2210	2746			3150	3284	Majchszak
6			328	386	426- 526	578	710		769	769	769	Kepferle
7			351	409	430		723		783		783	Kepferle
8	464	470 (509)	606	690	763	997	1133					Kepferle
9	(374)	415	(611)	694	767		1135				1175	Kepferle
10						750' elev	650' elev		610' elev		610' elev	Maynard
11			371						396			
*12	4738 (4618)	4796	4881	4902	5036	5357	5486	^{1/} (5640)	5678		5678	Wilson
*13	-	-	-	-	-	-	-	-	-	-	-	
*14	1714	1725	1754 (not recog.)			(2678)	3052	3158	3391	absent	3391	Schwietering
*15	2282	2293	2315 (not recog.)			3428	3835					Schwietering
*16	2077	2088	2110 (not recog.)			3228	3642					Schwietering
*17		2513	2520 (not recog.)			2925	3602	3710	3980	absent	3980	Schwietering
*18	2543	2547	2553 (not recog.)			2946	3661	3771	4045	absent	4045	Schwietering
19	2479	2499										
20						(617)	^{2/} 774 897	^{1/} (1142)				Van Lyne
21 + 25		NOT AVAILABLE										
26									^{3/} (6442) 6840	(8091)	8365	Piotrowski
27											4066	LeVan
28						Absent	Absent	Absent	(Absent)	61	120	Louden, 1965
29	503	525 (526)	580	640	1100	--	--	--	--	2089	(2197)	Stauffer, 1944
30	6.5	7.5 (33)	124	--	--	--	500	--	--	--	564	Carman, 1947

*Oriented core ^{1/}Rhinestreet Shale Member ^{2/}Pipe Creek Shale Member ^{3/}Mahantango Formation